REMARKS

Applicants appreciate the thoroughness with which the Examiner has examined the above-identified application. Reconsideration is requested in view of the amendments above and the remarks below.

Rejection under 35 USC § 102

Claims 1-10 stand rejected under 35 USC § 102 as being anticipated by Kalynushkin et al. U.S. Patent Publication No. 2003/0185977. Applicants respectfully traverse this rejection.

Claim 1

Applicants' invention as defined in claim 1 is directed to a novel and unobvious method of depositing material on a substrate by providing a reactor with a reaction chamber having a first volume, introducing a first precursor into the reaction chamber at the first chamber volume, contacting a surface of a substrate in the reaction chamber with the first precursor at the first chamber volume to react with and deposit a first layer on the substrate, and enlarging the reaction chamber to a second, larger volume and removing undeposited first precursor and any excess reaction product to end reaction of the first precursor with the substrate.

Kalynushkin '977 discloses the introduction of a vapor into an evacuated process chamber, the condensation of the vapor onto a heated substrate to form a liquid phase film, and the cooling of the liquid to solidify the liquid into a solid film. The Examiner has cited Fig. 1 and paragraph 0054 of Kalynushkin '977 as anticipating independent claim 1. Paragraph 0054 states in part:

> System 100 can include a dosing device 110, a process chamber 120 having an adjustable working volume and a valve 20 permitting isolation of the substrate from the other parts of the working chamber. *A decrease in the volume of the working chamber during the evaporation/condensation process can increase the vapor density and the rate of condensation of vapor on the substrate.* After the evaporation/condensation process is complete, a subsequent volume increase of the working chamber with the valve closed can be used to lower the temperature of the deposited layer resulting from adiabatic expansion, which can increase the rate of solidification of the film.

(Emphasis added.)

Kalynushkin '977 does not teach introduction of the vapor into an already-decreased chamber volume. Because Kalynushkin '977 condenses the vapor onto the substrate, in order for the vapor density to increase in the chamber, the vapor must necessarily be introduced into the chamber at a larger volume before the chamber volume is decreased. As such, Kalynushkin '977 fails to disclose or suggest that the precursor is introduced into the reaction chamber at the first, smaller chamber volume. Instead, Kalynushkin '977 introduces the vapor into the larger chamber volume before decreasing it to the smaller chamber volume. This alone prevents Kalynushkin '977 from anticipating the instant invention as defined in claim 1. Because there is no suggestion of introducing the precursor into the reaction chamber at the first, smaller chamber volume, claim 1 is likewise not obvious from Kalynushkin '977.

Furthermore, Kalynushkin '977 waits for the evaporation/condensation process to be completed before the chamber is increased to the larger volume. Kalynushkin

'977 does not disclose or suggest applicants' process of enlarging the reaction chamber to a second, larger volume and removing undeposited first precursor and any excess reaction product to end reaction of the first precursor with the substrate. Since Kalynushkin '977's deposition process has already ended with the chamber in the smaller volume, there is no reaction to end as the chamber enlarges.

Accordingly, applicants' claim 1 is not anticipated by the Kalynushkin '977 patent publication.

Claims 2 and 8

Applicant's claims 2 and 8 recite a repeat of the process steps for a second precursor to deposit a second layer. Kalynushkin '977's statement in paragraph 0086 merely states that the previously taught steps may be repeated. Since the previous disclosure did not teach the introduction of a precursor into the reaction chamber at the first, smaller chamber volume, this cited paragraph is likewise deficient in anticipating applicants' method of claims 2 and 8.

Claims 3 and 4

Dependent claim 3 requires purging the reaction chamber with a gas, and dependent claim 4 requires use of a vacuum, at the second volume to remove undeposited first precursor and any excess reaction product. Kalynushkin '977's disclosure of the use of an inert gas in paragraph 0067 and use of a vacuum in paragraph 0068 fail to teach or suggest that such inert gas or vacuum is employed when the chamber is at the second, larger volume. As such, there is no anticipation of the method of claims 3 and 4.

Claims 5 and 9

Applicants' claims 5 and 9 recite additional structural requirements for the method, wherein the reaction chamber includes a pedestal adapted to secure the substrate during the deposition and movable between first and second positions, with a first chamber section above the pedestal in the first position defining the first chamber volume, and a second chamber section outside the first chamber section. Claim 5 requires that the reaction chamber be enlarged to the second, larger volume by moving the pedestal to the second position such that the first and second chamber sections together with the pedestal in the second position define the second chamber volume.

The Examiner has taken the position that Kalynushkin '977's Fig. 1 discloses such as structure and method, by virtue of movement of item 12 and item 15. Item 15 is an "external compartment" of the chamber that is "expandable and contractible to permit the volume of the process chamber to be modified." Paragraph 0068. Item 12 is the substrate, and its support is not described as being movable. Accordingly, Kalynushkin '977 and its Fig. 1 does anticipate claim 5 because it does not describe any movable pedestal for the substrate that defines the enlargement between the first, smaller chamber volume and the second, larger chamber volume.

Rejection under 35 USC § 103

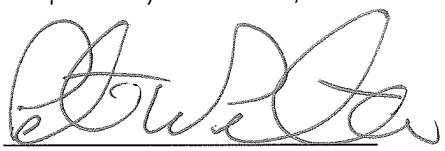
Claims 20-22 stand rejected under 35 USC § 103 as being obvious from Kalynushkin '977 in view of Vukelic U.S. Patent No. 5,268,034. Applicants respectfully traverse this rejection.

Dependent claims 20-22 recite that one or both precursors are diffused through a perforated plate above the pedestal in the reactor chamber. The Vukelic '034 patent discloses the use of a perforated plate in a fluid distribution head for a CVD apparatus.

However, Vukelic '034 does not disclose any method of deposition that employs different chamber volumes, and does not make up for the deficiencies of the cited Kalynushkin '977 patent publication. Therefore, claims 20-22 are not obvious from the cited prior art.

It is respectfully submitted that the application has now been brought into a condition where allowance of the entire case is proper. Reconsideration and issuance of a notice of allowance are respectfully solicited.

Respectfully submitted,



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